

REMARKS

Claims 1, 3-8, 10, and 12-22 are all the claims presently pending in the application. New claims 20-22 are added and no new matter has been added.

It is noted that the claims amendments are made only for pointing out the claimed invention more particularly, and not for distinguishing the invention over the prior art, narrowing the claims, or for statutory requirements for patentability. Further Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Applicant gratefully acknowledges the Examiner's indication that claim 8 is allowable and that claims 4 and 7 would be allowable if rewritten in independent form. Applicant submits, however, that all pending claims are allowable.

Claims 10 and 14 stand rejected under 35 U.S.C. § 101, for being directed to non-statutory subject matter.

Claims 14-19 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention.

Claims 1, 3, 5, 6, 10, 12, and 13 are rejected under 35 U.S.C. § 102(e) as being anticipated by Matsugu et al. (U.S. Patent No. 5,734,743) (hereinafter Matsugu).

These rejections are respectfully traversed.

I. THE CLAIMED INVENTION

An exemplary embodiment of the claimed invention, as defined by, for example, independent claim 1, is directed to a stereoscopic image processing apparatus for calculating

a parallax between a pair of images that includes correlation evaluating means for evaluating a correlation of brightness between a first pixel block provided in one of the pair of images and a second pixel block provided in the other of the pair of images and region size changing means for changing a size of the first and second pixel blocks in evaluating said correlation. A size of said first and second pixel blocks is changed in accordance with an area where the first pixel block is located in the respective pair of images.

Another exemplary embodiment of the claimed invention, as defined by, for example, independent claim 10, is directed to a stereoscopic image processing method of calculating a parallax between a pair of stereographic images, the method including evaluating a correlation of brightness between a first pixel block provided in one of the pair of stereographic images and a second pixel block provided in the other of the pair of stereographic images, and changing a size of the first and second pixel blocks. The changing of the first and second pixel blocks includes changing the pixel blocks in accordance with an area where the first pixel block is located.

Another exemplary embodiment of the claimed invention, as defined by, for example, independent claim 14, is directed to a stereoscopic image processing method of calculating a parallax between a pair of images, the method including evaluating a correlation of brightness between a first pixel block provided in one of the pair of images and a second pixel block provided in the other of the pair of images, dividing the area into two areas, an upper area and a lower area, by a horizontal boundary line, applying a weighting a factor to each of pixel constituting the first and second pixel blocks for the in evaluating the correlation based on whether each the pixel is in the upper area or in the lower area, and changing over the weighting factor for the evaluating the correlation.

Further, in some embodiments, a boundary determining section may determine a

boundary between two portions of the images. For example, the boundary may be the horizontal boundary between the road and objects above the road. The invention preferably calculates a parallax differently for objects on either side of the boundary. In other embodiments, the parallax is calculated differently based on ambient conditions, such as the weather.

Where conventional parallax calculations use large pixel blocks, a deviation may occur because when the correlation of brightness between paired pixel blocks is evaluated, a position of the identified pixel blocks on the comparison image is largely affected by a portion having a large brightness change. Alternatively, small pixel blocks may not be advantageous in low luminance situations.

The claimed invention, on the other hand, provides, among other things, “region size changing means for changing a size of said first and second pixel blocks for said correlation evaluating means, wherein a size of said first and second pixel blocks is changed in accordance with an area where said first pixel block is located in the respective pair of images,” as recited in claim 1. This feature allows the claimed invention to enhance the reliability of calculating the parallax. See the Application, page 2, Line 7 to page 3, line 14.

II. THE ALLEGED SECTION 101 REJECTION

On page 2 of the Office Action, the Examiner rejects claims 10 and 14 as being directed to non-statutory subject matter. While Applicant completely disagrees, in the interest of speeding prosecution, Applicant has amended claims 10 and 14 to further define that the method is associated with a “stereoscopic image processing apparatus.” Thus, claims 10 and 14 claim patentable subject matter.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection.

III. THE ALLEGED SECTION 112, SECOND PARAGRAPH REJECTION

On page 4 of the Office Action, the Examiner rejects claim 14 for reciting a limitation without sufficient antecedent basis. Applicant has amended the claim to obviate the rejection. Therefore, Applicant submits that claim satisfies the requirements of section 112, second paragraph.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw the rejection to claim 14 and to the dependent claims thereof.

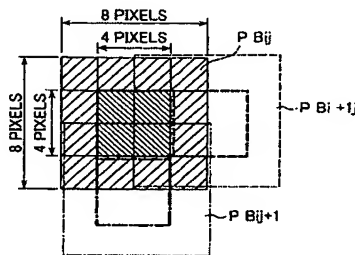
IV. THE ALLEGED PRIOR ART REJECTIONS

The Office Action rejects claims 1, 3, 5, 6, 10, 12, and 13 under 35 U.S.C. §102(e) as being anticipated by Matsugu. Applicant respectfully traverses these rejections for the following reasons.

In the claimed invention, in stereo matching, the size of an image area to be compared upon evaluation of correlation is changed in accordance with an absolute position on an image where the image area is located. Claim 1 for example, recites “correlation evaluating means for evaluating a correlation of brightness between a first pixel block provided in one of said pair of stereographic images and a second pixel block provided in the other of said pair of stereographic images.”

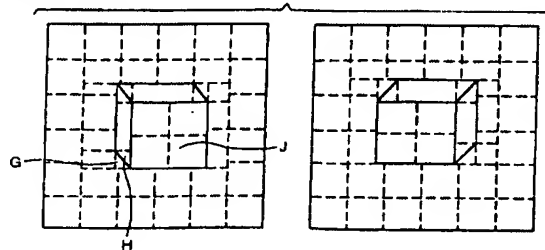
As exemplarily illustrated in Figure 2, different pixel block sizes (e.g., 4 or 8) may be used depending on a position of the blocks within the image. Accordingly, it is possible to optimize processes at a portion where mismatching is easily caused and at a portion where mismatching is hardly caused.

FIG.2



On the other hand, Matsugu is different from the claimed invention because an image area is limited in accordance with an edge generated in the left and right images. In Matsugu, a position where the edge is generated in the image changes in accordance with the image. Therefore, an image area is not limited on the basis of an absolute position (e.g., coordinate) on an image. That is, even in a case of the same position (or coordinates) on the image, a size or shape of the image area is changed in accordance with the image. As shown in Figure 6C of Matsugu, a position is established based on the location of the edge. *See e.g., Matsugu, Col. 6, Lines 12-24.* On the other hand, in the claimed invention, first, an image area is limited on the basis of an absolute position (coordinates) on an image. Therefore, a size of an image area is not changed in accordance with a feature of an image (except for the particular claim limitations of claim 7).

FIG. 6C



A. Claim 1

In particular, independent claim 1 recites, among other things, region size changing means for changing a size of first and second pixel blocks for the correlation evaluating means and a size of the first and second pixel blocks is changed in accordance with an area where the first pixel block is located in the respective pair of images. Claim 1 also recites, among other things, “correlation evaluating means for evaluating a correlation of brightness between a first pixel block provided in one of said pair of stereographic images and a second pixel block provided in the other of said pair of stereographic images.”

On page 5 of the Office Action, the Examiner alleges that Matsugu discloses “a size of the first and second pixel blocks is changed in accordance with an area where the first pixel block is located in the respective pair of images,” as recited in claim 1. Contrary to the Examiner’s allegations, however, claim 1 changes the pixel block size “for the correlation evaluation means,” and “in accordance with an area where the first pixel block is located.”

That is, where Matsugu changes a size of a block area where the edges of the block overlap another pixel block based on distances between central pixels of the block as described in Col. 4, Lines 50-54, the claimed invention operates completely different. Instead, the claimed invention changes the pixel block size based on the location within the image, not in relation to other pixels. Because of this difference, the claimed invention can distinguish between high and low brightness areas, such as above and below a horizon.

Furthermore, Matsugu does not disclose or suggest the claimed correlation evaluation means as claimed because Matsugu measures an “intensity” of a pixel, not of a pixel block. See Matsugu Col. 5, Lines 47-48. That is, Matsugu discloses a corresponding-point extraction method based on the central pixels of corresponding blocks while the claimed invention compares the blocks themselves. Thereafter, these central pixels are made to

correspond with each other. On the other hand, as described above, the claimed invention attempts to distinguish different regions in the image for different processing.

Therefore, Matsugu fails to disclose or suggest the claimed invention because Matsugu operates in a completely different fashion and manner than the claimed invention.

Furthermore, with respect to claim 3, the Examiner alleges that Matsugu discloses “a boundary determining section, the boundary determining section being configured to divide the stereographic images into two areas, an upper area and a lower area, defined by a horizontal boundary line.” Contrary to the Examiner’s allegation, Matsugu discloses the completely different method of determining boundary overlap and not determining an image boundary line as recited in claim 3.

Accordingly, because Matsugu does not teach every element as claimed in independent claim 1, claim 1 is improperly rejected in light of Matsugu. Accordingly, Applicant submits that claim 1 is in condition for allowance. With respect to claims 3, 5, and 6, and 15-19, which depend from independent claim 1, each of these claims contain all the limitations contained within claim 1 and are therefore also in condition for allowance.

B. Claim 10

Independent claim 10 recites, among other things, a stereoscopic image processing method that includes evaluating a correlation of brightness between a first pixel block provided and a second pixel block and changing a size of the first and second pixel blocks so that the first and second pixel blocks change in accordance with an area in which the first pixel block is located.

Contrary to independent claim 10, Matsugu does not teach or suggest changing a size of the first and second pixel blocks so that the first and second pixel blocks change in

accordance with an area in which the first pixel block is located during an evaluating of a correlation of brightness between a first pixel block and a second pixel block. That is, the allegation that Matsugu discloses the invention as recited in claim 10 suffers from the same deficiencies as described above with respect to independent claim 1. Matsugu discloses adjusting pixel block size based on respective central pixel locations and not “in accordance with an area in which the first pixel block is located,” as recited in independent claim 10.

Accordingly, because Matsugu does not teach or suggest every element as claimed in independent claim 10, claim 10 is improperly rejected in light of Matsugu. Accordingly, claim 10 is in condition for allowance. With respect to claims 12 and 13, which depend from independent claim 10, each of these claims contains all the limitations contained within claim 10 and are therefore also in condition for allowance.

III. NEW CLAIMS

Applicant has added new claims 20-22. Applicant respectfully submits that new claims 20-22 present no new matter and are supported in the specification. Applicant submits that new claims 20-22 are patentable over the cited references at least for analogous reasons to those set forth above with respect to claims 1-8, 10, and 12-18.

IV. FORMAL MATTERS AND CONCLUSION

On page 4 of the Office Action, the Examiner objects to claims 8 and 14 due to various informalities contained therein. Applicant has amended these claims to obviate the objection. Accordingly, Applicant respectfully requests the Examiner to withdraw these objections.

In view of the foregoing, Applicant submits that claims 1, 3-8, 10, and 12-22, all the

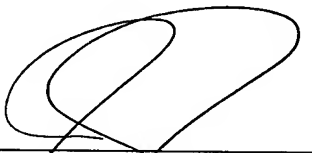
claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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